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## BASALTOID ROCKS OF THE AKCHINSKOE INTRUSION IN THE PRODUCTION OF ACID-RESISTANT MATERIALS

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Acid-resistant ceramics based on basaltoid rocks from the Akchinskoe intrusion are developed. The technological aspects of its production are considered, and the batch compositions of ceramic mixtures and the service properties of articles are presented.

The main raw materials for producing acid-resistant articles are pure plastic clays without dangerous impurities that sinter at a temperature of 1100–1200°C and chamotte, i.e., clay fired to a certain state. However, production of chamotte entails substantial labor and electricity consumption and calls for additional machinery.

We investigated the possibility of using gabbro, i.e., a basaltoid rock of the Akchinskoe intrusion situated on the left bank of the Angren River, as the grog component.

The gabbro, comprising about 90% of the intrusive rocks, consists of plagioclase, monoclinical pyroxene, hornblende, and biotite.

Plagioclase is the dominant rock-forming mineral, whose content is 40–60%.

Pyroxene is found everywhere. Its content reaches 20% in pyroxene-hornblende gabbro and keeps decreasing to complete disappearance in hornblende and biotite-hornblende gabbro.

Hornblende is abundant and forms elongated, sometimes isometric grains; it evolves over pyroxene and partly or fully replaces it.

The content of biotite is 5–7%; it evolves over hornblende and sometimes over plagioclase.

The chemical composition of the gabbro is as follows (wt.%): 43.70 SiO<sub>2</sub>, 0.99 TiO<sub>2</sub>, 9.41 Al<sub>2</sub>O<sub>3</sub>, 19.32 Fe<sub>2</sub>O<sub>3</sub>, 11.46 CaO, 10.84 MgO, 0.42 MnO, 0.91 K<sub>2</sub>O, 1.33 Na<sub>2</sub>O, 0.28 P<sub>2</sub>O<sub>5</sub>, 1.32 calcination loss.

The lump rock that arrived from the quarry was fired at a temperature of 1000–1100°C, which facilitated its subsequent grinding and improved the thermal properties of products based on this material. The fired gabbro lumps were subjected to basic crushing in a jaw crusher with subsequent grinding in a ball mill.

A fine-grained mixture containing (%) 45 Angrenskoe clay, 10 pegmatite, 35 gabbro, and 10 quartz sand was prepared for plastic molding using the slip casting method. The

slip was prepared by wet grinding in a ball mill, the components being fed in several batches, and was dehydrated on a filter press to 20% moisture content. The cakes were passed through screw presses, and the resulting cords were matured for 2–3 days. The plastic mixture prepared in this way was used to mold articles.

The articles were molded by the semidry-press process from granulated powder with 11–13% moisture content.

### Physicochemical properties of articles determined on standard samples

|                                      |       |
|--------------------------------------|-------|
| Firing temperature, °C . . . . .     | 1150  |
| Density, g/cm <sup>3</sup> . . . . . | 2.5   |
| Bending strength, MPa . . . . .      | 102.0 |
| Thermal resistance, cycles . . . . . | 35    |
| Acid resistance, % . . . . .         | 98.1  |
| Alkali resistance, % . . . . .       | 93.0  |

In order to increase the thermal resistance and the mechanical strength, talc and corundum were additionally introduced into the mixture composition. The mineralogical composition of the acid-resistant material was (%): 35 refractory clay, 10 pegmatite, 10 talc, 35 gabbro, and 10 alumina.

The talc was preliminarily roasted at a temperature of 1300°C. At this temperature, talc converts to clinoenstatite, which increases the yield of cordierite in the firing interval.

### Physicochemical properties of articles based on the obtained mixture

|                                      |       |
|--------------------------------------|-------|
| Firing temperature, °C . . . . .     | 1180  |
| Density, g/cm <sup>3</sup> . . . . . | 2.8   |
| Bending strength, MPa . . . . .      | 110   |
| Thermal resistance, cycles . . . . . | 50    |
| Acid resistance, % . . . . .         | 99.63 |
| Alkali resistance, % . . . . .       | 94.5  |

The good mechanical properties of ceramics based on Akchinskoe intrusive gabbro are related to the presence of a substantial volume of crystalline phases, and the high chemical resistance of the material is determined by the high chemical resistance of the gabbro.

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